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> downward progress of water. Nothing can arrest the destruction of the rocky crust so long as there is rock to be broken. The entire solid crust of the earth must be transformed, must be rent into fragments. The water reaches the molten mass below and can go no farther. . . . .
>
> Again the phenomenal changes and the condition of the earth's crust embarrass our powers of description, and even conception. The water having reached the molten mass below the fragmental crust, could go no farther. It had reduced the temperature of the upper surface more nearly to that of boiling water, while that of the molten mass below the broken crust was nearly forty-four hundred degrees higher. The entire mass, thirteen miles in depth of débris and water, is kept in violent motion by the resistless power of steam over the entire surface of the globe.

On this "true basis," in negligence of the most obvious limitations of a well-recognized action, the author builds theories of elevation, vulcanism and stratification, and assumes that he has solved some of the great problems of geology.

Those who are not well versed in what is established will read the book at much risk of mixing needless error with truth, while those who are so versed will probably find it interesting chiefly as a psychological study.

The book is pervaded by an ostentatious piety of the type prevalent in the last century, which is liable to produce a moral effect quite opposite to that intended. True reverence is best displayed by refraining from presuming to know the mind and purpose of the Infinite and by scrupulously dissociating one's imperfect notions from all connection with Omniscience. T. C. C.

Text-Book of Paleontology, by KARL A. VON ZITTEL, translated and edited by CHARLES R. EASTMAN. Vol. I, Part II, pp. 353–706, with 883 wood-cuts. Macmillan & Co., 1899.

After an interval of more than three years since the appearance of Part I, the invertebrate portion of Zittel's Paleontology is at last brought to a conclusion. The plan and scope of this work was discussed at length in a review of Part I, which appeared in this JOURNAL for October 1896; hence it is only necessary to repeat here that the English edition is a composite production, much of Zittel's text being discarded and replaced by original contributions from a dozen different authors, whose names are given on the title-page.

The Grundzüge der Paläontologie, which forms the basis of the present work, is an essentially modern, useful, and very compact treatise. It compasses within 900 odd pages the whole field of paleozoölogy, rather more than one half of the space being devoted to invertebrates. The descriptions of genera are brief but to the point, the illustrations numerous, and the arrangement simple and well-balanced. These are salutary features for any elementary text-book to possess, and the writings of von Zittel have set a high standard for other authors to emulate.

As compared with the original, we note in the first place that the English edition devotes about 200 more pages to the invertebrates, and is enriched by nearly 100 new figures. Over 4600 generic names are enumerated in the index, being about 1200 in excess of the invertebrates treated in the German edition. The amount of enlargement is therefore considerable, and the new genera introduced are mostly those which are of importance in American and British strata.

All the generic diagnoses are of necessity very brief, and large numbers of names are cited without definition, simply as an index to their family position, or degree of family differentiation. Typical or otherwise interesting forms are treated more at length, and in some instances type-species are listed; but the definitions of families and larger groups are as a rule succinctly yet carefully stated. The book serves as an excellent guide for orientation over the different groups and as a catalogue of the more important genera, but does not permit of the identification of less important genera without the aid of special literature. In compensation for this, copious bibliographies are inserted under nearly every caption, those for the Cephalopods and Trilobites being especially complete and all of them brought strictly up to date.

Many radical changes are to be observed in the classification, the responsibility for which, we are told in the preface, lies with the revisers of the different sections. The rearrangement of Pelecypod families and genera by Dr. W. H. Dall is in accordance with the latest conceptions of this eminent conchological authority. Great emphasis is laid by Dr. Dall on the distinctness of family groups, and many well-known genera are taken by him to represent types of new families, or subfamilies. Nor is Dr. Dall alone in this tendency toward elevation of families out of generic characters; it seems to be becoming more and more the fashion in all branches of systematic biology, and probably the most remarkable illustration of all is to be seen in Professor Hyatt's new classification of Cephalopods. The chapters on Nautiloids and Ammonites, occupying 75 pages, have been entirely rewritten by Professor Hyatt, and represent in epitome a life work expended on the study of these groups. The system followed was proposed in outline at the Boston meeting of the American Association, two years ago. Its essential feature consists in the elevation of the three leading "genera" of von Buch, *Goniatites*, *Ceratites*, and *Ammonites*, together with the Clymenoids of Gümbel, into as many different suborders, and in addition to these, several entirely new ones are recognized among the Goniatites and Ammonites. A large number of genera are made the types of independent families, and the prevailing feature throughout is the comparison of young stages of specialized forms with the adult of primitive types. As the entire life history of Ammonites and other groups are recorded in the progressive changes taking place in the shell, this class of organisms is especially well suited for comparative investigations based on the principle of accellerated development.

The chapter on Trilobites is from the pen of Professor C. E. Beecher, our leading authority on this group. The treatment is much fuller than in the original, and a considerable number of new figures are added. As in the Ammonites it is of prime importance to compare the ontogenetic stages, and this furnishes the key to the new classification of Beecher, since adopted by Cowper, Reed, Bernard, and others, although opposed by Pompeckj. Trilobites are here accorded the rank of a separate subclass, all other crustacean forms being set off against them under the title of Eucrustacea. The latter have been revised for the present work by Professors J. M. Clarke and J. S. Kingsley, with the exception of the Ostracoda, which are accredited to Mr. E. O. Ulrich. A noteworthy point consists in the removal from Crustacea of the Merostomata, including Limulus, the Eurypterids, etc., and associating them with the Arachnids under the head of the *Acerata*, of Kingsley. This step, it is believed, will eventually be acquiesced in by most specialists on these groups. Altogether, the chapters on Arthropods show evidence of most careful revision, and are well-balanced as regards space.

We come lastly to the chapters on Arachnids, Myriopods, and Insects, which have been revised and slighly enlarged by that indefatigable paleoentomologist, Professor S. H. Scudder. Save for being simpler and briefer, the treatment is much the same as that followed in the *Handbook* of von Zittel, the chapters in question having been prepared for that work by the self-same author. Here also new figures are inserted, a very striking one being Brongniart's restoration of *Meganeura*, a dragon-fly having an expanse of 30 inches between tips of wings. The book concludes with a complete index of genera and subgenera.

The present edition of the von Zittel places in the hands of every English-speaking student a good elementary text-book that has long been needed. It is significant that in the "Eastman translation" so much American material has been introduced, and that so much revision has been done by American specialists.

Regarding the work as a whole we may repeat what was said of the first part, that educators in general owe to Dr. Eastman a deep debt of gratitude for providing our college and higher schools with a "translated, revised, and enlarged edition" of the best manual of paleontology that has ever been written. Professor von Zittel is to be congratulated, not only for the improvement presented by his new elementary text-book, but also, as shown by the results, for having entrusted the preparation of the translated edition to such excellent hands.

CHARLES R. KEYES.

The Gold Measures of Nova Scotia and Deep Mining. By E. R. FARIBAULT. Canadian *Mining Review*, March 1899, Pp. 11, with 6 plates.

E. R. Faribault, of the Canadian Geological survey, has lately announced the results of fifteen year's work on the gold measures of Nova Scotia. These results are of great interest, both from a scientific and economic standpoint.

The gold measures of Nova Scotia are confined to the metamorphic Lower Cambrian quartzites and slates, forming a belt along the Atlantic coast from 10 to 75 miles wide. Intruding these rocks are large masses of granite occupying nearly a third of the superfices of the province. These were intruded in Silurian time, after the folding of the strata and deposition of the gold-bearing quartz, and need not be considered. The originally horizontal quartzites and slates have been folded into a series of huge undulations roughly parallel with the seacoast. The amplitude of the folds varies considerably, but